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SPECIAL BIBLIOGRAPHY

SB-61-9

DUST CONTROL TECHNIQUES FOR CLEAN ROOMS

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Compiled by

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$3.60

DUST CONTROL TECHNIQUES FOR CLEAN ROOMS

The primary scope of ~~this search~~ was to find design specifications and construction techniques for dust-free areas usually denoted by the terms "clean rooms" or "white rooms".

While many references are available on monitoring and sampling techniques little information exists on "clean rooms". A verification of this statement can be found by a perusal of the Autonetics bibliography of dust control (see entry under Chandler, G.I.).

Correspondence was initiated with Armour Research Foundation one of the leading organizations in the study of dust control. A conclusive but negative reply was received to the effect that a search initiated at Armour Research Foundation resulted in a decision to develop its own standards because of the lack of available information in this area.

Due to rapidly changing techniques in this field, no effort was made to include material published prior to 1955.

In addition to exhausting the resources of the Technical Information Center, Lockheed Missiles and Space Division and ASTIA, the following publications were checked:

AERO/SPACE ENGINEERING, 1955-to date

AERONAUTICAL ENGINEERING INDEX, 1955-58

APPLIED SCIENCE & TECHNOLOGY INDEX, 1955-to date

CHEMICAL ABSTRACTS, 1955-to date

ENGINEERING INDEX, 1955-to date

PAL UNITERM INDEX, 1955-to date

1. Alden, J.L.

Experiments with miniature cyclones.

AIR CONDITIONING, HEATING & VENT. v.

56, n. 9 p. 64-68, September 1959.

Examination of cone proportions, cylindrical body length, inlet area, and air outlet area to determine their influence on pressure drop and capacities of small cyclones; it is concluded that cone slenderness or overall length distribution between cone and body appears to be of minor importance; test methods and results for industrial design purposes.

2. Andrew, O.E.

Care and handling of instruments for

konimetry. CAN. MIN. J. v. 80, n. 8,

p. 66-68, August 1959.

Konimeter is portable dust sampling instrument that can be used in almost any situation in mine or plant; construction specifications that affect sampling consistency and efficiency.

3. Archer, W.E.

Troubleshooting dust collectors.

CHEMICAL ENGINEERING v. 65,

p. 188, 190, 192, December 1958.

A discussion of maintenance problems with dust collectors.

4. Avery, R.H.

Meaning of "Clean Air". AIR ENG.

v. 1, n. 2, p. 29-32, May 1959;

p. 28-31, 51, June 1959.

Discussion of "clean air" in terms of dirt particle size and its relationship to degree of cleanliness desired; consideration of air conditioning requirements and equipment based on temperature, humidity and dust control; use of

pressurization, air showers and adjustable louvers in air lock; design material, and equipment selection for "white rooms"; work psychology; dust hazards.

5. Badzioch, S.

Collection of gas-borne dust particles by means of aspirated sampling nozzle. BRIT. J. APPLIED PHYSICS v. 10, n. 1, p. 26-32, January 1959.

Efficiency shown theoretically to depend on ratio of velocity of aspiration into sampling nozzle to velocity of undisturbed gas stream, and ratio of length representing distance of disturbance upstream of nozzle to "range" of particle; "range" is defined as distance particle would travel, before coming to rest, if projected into still gas with velocity equal to that of gas stream.

6. Barrett, J.C.

Techniques of laboratory ventilation. SAFETY MAINTENANCE v. 119, p. 28-32, January 1960.

7. Barth, W.

Berechnung und Auslegung von Zyklonabscheidern. BRENNSTOFF-WAERME-KRAFT v. 8, n. 1, p. 1-9, January 1956.

Calculation and layout of cyclone separators, based on recent investigations, with aid of simplified theories of flow conditions in cyclone; method is developed for determining relations between pressure loss, cleaning capacity and geometrical dimensions.

8. Begriffe und Bezeichnungen bei Pruefverfahren fuer quantitative Staubbestimmung und qualitative Staubuntersuchung. TECHNIK

v. 11, n. 12, p. 845-47, December 1956.

Definitions and terminology applicable in qualitative and qualitative analysis of dust; measurement of qualitity of dust and dust content and concentration in quiescent and moving systems; types of apparatus employed; law of precipitation of dust particles.

9. Benstock, G.

Dust-free clothing for white rooms.

AIR ENGINEERING v. 2, n. 12, p. 45,

60, December 1960.

It's vital to the success of a super-clean facility that proper personnel clothing be selected. Here are some of the things you should look for in clothing evaluation and purchasing programs.

10. Bodnar, G.

DETERMINATION OF THE DUST PARTICLE SIZES

PASSED THROUGH A CODEA-77 AIR CLEANER

DURING A FINE DUST EFFICIENCY TEST.

Detroit Arsenal, Centerline, Mich.

Report No. 2886, 6 Apr 54, 3p. ASTIA

AD-37 442

11. Brown, J., Jaap, W.J. and Ritchie, P.D.

Physico-chemical studies on dusts--10.

JOURNAL OF APPLIED CHEMISTRY v. 9, pt. 3,

p. 153-59, March 1959.

Comparative study of solubility and adsorptive properties of finely divided silica and titania; surface properties were compared in effort to find significant difference which could be correlated with differences in pathogenicities of two dusts should have negligible solubility, as compared with silica dusts, in lung fluids. Pt 9 indexed in ENGINEERING INDEX 1956, p. 285.

12. Caplan, K.J.

Current applications of the reverse jet

principles. AMA ARCHIVES v. 21, n. ,

p. 200-208, March 1960.

A recapitulation of the reverse-jet filter is given, an explanation of the basic principles is presented along with the industries or applications the filter is best suited for.

13. Chandler, G.I.

BIBLIOGRAPHICAL STUDY ON DUST CONTROL

ENGINEERING: METHODS, EQUIPMENT AND

APPLICATIONS. Autonetics, Downey, Calif.

Report No. EM-5980, 31 Mar 60, 122p.

ASTIA AD-242 213

This bibliography was prepared to serve as a literature guide on dust analysis and equipment in their application to environmentally-controlled dust-free areas at Autonetics. The 340 references, which include books, reports, papers and periodical articles, cover the following subjects: (1) Particle motion studies and the Brownian Movement; (2) Principles and methods of particle analysis and size determination; (3) Theory and comparison of equipment and instruments for dust analysis; (4) Special techniques, including electron microscopy; (5) Filters and filtration; and (6) Dust control in industry. References are arranged by author under the year of publication. Material dates from 1827, with emphasis on information published between 1950 and 1959. The report is partially annotated; abstracts are included where possible. An author index, and a subject index in outline form follow the abstracts.

14. Collector for fume and dust control.

MACHINERY (NEW YORK) v. 66, n. 6,

p. 176-77, February 1960.

A discussion of the application of the "pressure-jet" method of removing high-temperature fume and dust emission.

15. Collector handles dust problem.

STEEL v. 140, n. 25, p. 122, 24

June 1957.

Entire unit of this collectory mounts directly in ductwork. Axial fan draws dust-laden air through water spray...Spiral centrifuge separates the dust from the water.

16. Collectors control airborne dust.

IRON AGE v. 179, n. 26, p. 110,

112, 27 June 1957.

17. Cook, G.H.

SUPERCLEAN ROOMS-MUST THEY BE EX-

PENSIVE? MISSILE DESIGN AND DEVELOP-

MENT. Oct 60, p. 54-55.

18. Cruise, A.J.

Microscopic dust. ENGINEERING v. 183,

n. 4750, p. 366-68, 22 March 1957.

Deposition patterns of dust particles and their effect on different sampling methods; instruments used included thermal precipitator, sedimentation cell where particles are deposited vertically by gravity, and horizontal sedimentation unit where particles settle out as result of both vertical and horizontal movement.

19. Culhane, F.R.

Dust collection system solves dental

laboratory's dust problem. HEATING-

PIPING v. 28, p. 92-94, April 1956.

20. Curtain-type grit and dust arrestor.

ENG. & BOILER HOUSE REVIEW v. 74,

n. 4, p. 109-10, April 1959.

Construction details of "DEP" dust control equipment manufactured by W.G. Allen & Sons, Great Britain; filtering medium comprises number of grids, placed one behind other in staggered formation to form single curtain, or banks of curtains; principle of operation; further development of "ALLEN-DEP" curtain with electrostatic precipitation, so arranged that rear curtain constitutes precipitation or positive electrode, while first one acts as pre-filter to h-t negative electrode.

21. Daniels, T.C.

Investigation of vortex air cleaner.

ENGINEER v. 203, n. 5276, p. 358-62,

8 March 1957.

Air cleaner test rig and method of testing; intrinsic efficiency of vortex cleaner; photographing dust distribution inside vortex tube; conclusion is that vortex cleaner with stator blades is primarily separator, i.e., it shows little classification over range of particle size tested; however, when walls of vortex tube are wetted, intrinsic efficiency is that of classifier with rapid drop in efficiency just below 10 microns particle size.

22. Davies, C.N.

DUST IS DANGEROUS. London, Faber &

Faber, 1954.

A discussion of dust concentration-the maximum allowable amount preventive measures and dust explosions. One section of the book deals with dust sampling.

23. Dawes, J.G., Greenough, G.K. and Seager, J.S.

Penetration of irregularly-shaped particles

through airborne-dust elutriator. BRITISH

JOURNAL APPLIED PHYSICS v. 8, n. 6, p. 236-41,

June 1957.

Connection established between shape factor distribution relating projected area diameters and Stokes' diameters of particles in dust cloud, and penetration efficiency of standard elutriator for those particles determined by microscope evaluation of thermal precipitator samples taken with and without elutriator; estimation of mean value of shape factor of cloud, and its coefficient of variation.

24. Dentsman, H. and Schultz, M.

How to stamp out dust.

IND. PHOTO. v. 9, n. 5, p. 8, 63,

May 1960.

A discussion of the causes of dust problems in a photography laboratory with some possible solutions.

25. Dr. Grabow puts dust in its place

in manufacture of pre-smoked pipes:

central dust collector system. PLANT

ENGINEERING v. 14, p. 122-23, March 1960.

Central dust collector system reduces maintenance costs 15% plus fuel savings of 25%.

26. Dust collector with air backwash.

CHEM. & ENGRG. NEWS v. 35, p. 68,

July-Sep 1957.

Air jets reverse flow, blast cake from filter bags; give reduced maintenance costs and longer bag life.

27. Dust control and ventilating conference, sixth. CANADIAN MINING

JOURNAL v. 78, p. 128-34, Sep 1957.

28. Dust control for continuous and intermittent operations. CER. AGE v. 69, n. 2, p. 20-21, February 1957. See also: PLANT ENGINEERING v. 11, n. 4, p. 99, April 1957.

Demountable aluminum room for break-up of 20-ton fused crystalline "nugget" is feature of dust control system at Synthetic Mica Corp; mixing hoppers and elevating conveyors for raw materials, and pelletizing machine, are completely enclosed; dust collection hood is used at weighing station; exhaust piping for parts's finishing line is lowered to bench level; Pangborn collector has capacity of 10,000 cfm of air.

29. Dust-free air for gyroscopes. AIR ENG. v. 1, n. 2, p. 40-42, May 1959.

$250,000 research laboratory of Lear, Inc, Grand Rapids, Mich, for developing prototypes of small gyroscopes for missile systems, has single air conditioning system holding temperatures to 71 F plus or minus 1 F and RH to 35% plus or minus 2%, and maintains static pressures of 3, 2 and 1 in. in three separate areas; conditioning and dust control facilities; use of special clothing; system layout.

30. Dust-free building aids production. HEATING & AIR TREATMENT ENGINEER v. 19, n. 10, p. 270-71, October 1956.

Factory extension built by R.B. Pullin Group at Brentford, Great Britain; air circulation and filter system installed in which air can be drawn from outside through controllable louvres, or from inside through series of low level extraction grilles fitted just above skirting level; filtered air is warmed or cooled as required and redistributed through "Airmaster" diffusers built into roof.

31. Dust sampling; isokinetic sampling apparatus. ENGINEERING v. 186, p. 230, 22 August 1958.

32. Effenberger, E.

Vergleichmessungen mit verschiedenen Staubmessverfahren. STAUB v. 19, n. 2, p. 44-46, February 1959. (In German)

Comparison of various methods for measurement of dust fall; report on comparative measurements with DIEM adhesion foil method, Loebner dust collection apparatus and Effenberger registering appliance, carried out during 12 mo. period; statistical correlations found between results obtained with various devices.

33. Eichler, E.

Fragen der Staubasbscheidung. TECHNIK v. 11, n. 8, p. 585-90, August 1956.

Problems of dust precipitation; necessity for determining dust content of air or gases, for selection of most suitable collectors or filters; dust measuring and precipitation methods classified and discussed.

34. Esche, C.G.

Mechanische entstaubungsverfahren. TECHNIK v. 10, n. 11, p. 669-73, November 1955. (In German)

Mechanical dust removal systems, with particular reference to large centrifugal collectors, such as cyclones and ultrasonic separators.

35. Filter-type dust collector.

MECHANICAL ENGINEERING v. 79, p. 762-63, 1957.

A description of the "MIKRO-PULSAIRE COLLECTOR" is given in this article; also, brief comments on its efficiency and maintenance costs are made.

36. Five dust and fume problems and how they were solved. SAFETY MAINTENANCE v. 118, p. 36-38+, December 1959.

37. Friedrich, H.E.
Collection report on new type wet scrubber. AIR ENG. v. 1, n. 2, p. 23-25, 51, May 1959.

Construction and mechanical features of hydraulic scrubber using finely atomized spray system for particle conditioning, and initial contaminant separation by cyclonic action; scrubber has high removal efficiency for gas volumes of 2000 to 65,000 cfm using water quantities of 3½ gpm per 1000 cfm and air and hydraulic horespower of 1.3 to 2.5 per 100 cfm; application to galvanizing, lime hydrate production and coke breeze drying described.

38. Futer, R.E.
Dust removal in paper converting operations. PAPER INDUSTRY v. 4, p. 634-35, December 1959.

The development of high-velocity, slot-type, retractable hoods have solved the dust problem in Crown-Zellerbach's converting operations.

39. General Motors Corp., New Departure Div.
World's cleanest white room spurs bearing production. IRON AGE v. 186, p. 88-89, 24 November 1960.

40. Grit and dust sampling techniques. ENGINEER v. 209, p. 108, 15 January 1960.

The equipment described in this article uses a standard miniature cyclone tube with a textile sleeve filter. Its primary applications are for grit and dust sampling of boiler flue gages and in industrial processes.

41. Guthmann, K.

Staubgehaltsmessung in Industriegasen und Atemluft, Staubniederschlagsmessungen im Gelaende. STAHL U EISEN v. 79, n. 16, p. 1129-41, 6 August 1959. (In German)

Measuring dust content of industrial gases and in air, and also amount of dust carried afield; review of methods and apparatus used in dust control; critique of different methods.

42. Gutterman, B.

Dust properties and dust collection. ASCE PROC. v. 85 (J. SANITARY ENG. DIV.) n. SA4, pt. 1 Paper No. 2088, p. 25-69, July 1959.

Analytical methods to permit calculation of re-entrainment and backmixing characteristics of dust suspensions and dust layers; methods are based on physical properties of dust and fluid conveying or acting on dust; in case of diffusion ratio close to unity, backmixing by turbulent diffusion can be expected; concentration gradient can be predicted with fair accuracy if velocity profile and one point of concentration is known.

43. Hamada, A. and Shimazu, M.

On quantitative x-ray diffraction analysis on quartz in submicro amount of dusts. MIN. & MET. INST. JAPAN-J. v. 75, n. 856, p. 906-10, October 1959.

Principle of analysis and errors involved; fluorite powder was used as internal standard; error recognized was plus or minus 5%; if intensity is not compensated according to particle size large errors may result in using plotted curves.

44. Hamilton, R.J. and Phelps, B.A.
Production of transparent profiles of dust particles as aid to automatized particle counting. BRITISH JOURNAL OF APPLIED PHYSICS v. 7, n. 5, p. 186-88, May 1956.

How technique of "shadowing" by metal evaporation in vacuum has been adapted to production of plane "negative" images of dust deposits on microscope slides at natural size by vacuum evaporation of metal at right angles to slide, and subsequent removal of dust; slide receives precise impression of geometric projections of particles, and correspondence of image and object is exact; sample micrographs.

45. Hammett, E.C.
New look at dust control. WESTERN MACHINERY & STEEL WORLD v. 47, n. 8, p. 66-69, August 1956.

Basic types and functions of dust collecting equipment; illustrated examples of applications in west coast shops.

46. Hasenclever, D.
Praktische probleme der Feinstaubmessung. ZEIT FUER ERZBERGBAU U METALLHUETTENWESEN v. 9, n. 1, p. 11-17, January 1956.

Practical problems of dust analysis; importance of accuracy stressed; requirements and selection of dust counter; particulars of thermal precipitator, Konimeter HS, Tyndallometer, and gravimetric dust analyzer.

47. Harris, W.B. and Mason, M.G.
Operating economics of air-cleaning equipment utilizing the reverse jet principle. IND. & ENGRG. CHEM. v. 47, p. 2423-25, Sep-Dec 1955.

While this article describes the problems encountered with uranium dust, the in-plant phase of filtering may have some application to the photographic lab.

48. Haskins, R.E.

Air conditioned plant includes super-clean white room. C. P. Claire Co. PLANT v. 22, p. 46-47, October 1960.

49. Havemann, H.A. and Bhaktavatsalanaidu, B.S.

Experiments on new type of dust separator for steady and pulsating flow. INDIAN INSTITUTE SCIENCE JOURNAL-Sec. B, v. 39, n. 1, p. 23-51, 1 January 1957. 3 supplement plates.

Account of development and operational qualities of new cyclone type separator; unit is characterized essentially by straight cylindrical walls and conical insertion pointing upwards in lower part of body of separator supported by cover plate of dust bunker; experiments to determine optimum dimensions.

50. Hemmeon, W.C.L.

Dust particle inertia and various consequences. HEATING, PIPING & CONDITIONING v. 29, n. 2, p. 247-50, February 1957.

Importance of determinations of dust particle distribution; calculation of magnitude of particle inertia; relation of particle inertia to dust control, flue gas measurements, particle size determination, and to dust collector performance.

51. Holmes-Rothmule multi-cell cyclone dust collectors. ENGINEER v. 208, p. 207, November 1959.

52. How to control particulate emission. HEATING AND PIPING v. 31, p. 137-52, June 1959.

53. How to get rid of dust; Black and Decker Mfg. Co. MILL AND FACTORY v. 62, p. 140, February 1958.

54. Hughes, T. Improved methods of particle size analysis. ENGINEER v. 203, n. 5289, p. 860-64, 7 June 1957.

But adopting new methods of dispersal, it is possible to elutriate sticky kinds of dust which do not respond to standard method of elutriation; it is also possible to reduce time of elutriation for free flowing kinds of dust; reduction in time for elutriation obtained when special measures were adopted to disperse dust either in standard apparatus or when using special attachment; apparatus used was basically air elutriator of Gonell type.

55. Johns, L.M. Maintenance for dust control systems. FOUNDRY v. 85, p. 124-27, October 1957.

Keeping dust control systems in proper operating condition requires a definite and adequate preventive maintenance program. Maintenance should not be delayed until expensive, disruptive breakdowns occur.

56. Keeping up with dust and fume control developments. SAFETY MAINTENANCE v. 116, p. 48-55, December 1958.

57. Keeping up with dust and fume control developments. SAFETY MAINTENANCE v. 119, p. 48-57, February 1960.

58. Kline, G.R.
White rooms for project mercury.
AIR ENGINEERING p. 28-32, 58, November 1960.

A speck of dust in complex gear of manned space capsule in project Mercury could tumble astronaut out of orbit. Here's how McDonnel Aircraft Corp. builds space capsules under superclean conditions. Article gives white room design, construction, make-up air and zone control, maintenance details.

59. Kramer, H.F. and Johnstone, H.F.
COLLECTION OF AEROSOL PARTICLES IN THE PRESENCE OF ELECTROSTATIC FIELDS.
Illinois U., Engineering Experimental Station, Urbana. Report No. AECU 2972, 1954, 44p. (Contracts AT(30-3)28 and AT(11-1)276) ASTIA AD-69 392

A fundamental study of the deposition of particles on stationary sperical and cylindrical obstacles from a moving aerosol stream in the presence of electrostatic forces is of value in predicting the performance of new types of dust removal equipment. Theoretical equations were derived for the fraction of the aerosol deposited. An electronic digital computer, the ILLIAC, was used to solve the equations. The deposition of homogeneous dioctyl phtalate aerosol on a spherical collector was measured experimentally with various combination of charged and uncharged collectors and aerosol particles. The experimental results agree with those predicted by the theory within the accuracy of the analytical methods used to measure the deposition. As a result of the investigation, two new types of dust collection equipment are proposed for pilot plant study.

60. Kristal, E., Dennis, R. and Silverman, L.

Study of multiple Venturi wet collector.

AIR POLLUTION CONTROL ASSN. JOURNAL v. 6,

n. 4, p. 204-11 (discussion) 212-13,

February 1957.

Experimental model of new type wet collector was investigated at Harvard University; unit consists of single or multiple collection stages, each containing Venturi tube and two spray generators; principal collecting mechanism is impingement of dust particles and water droplets in spray chamber and in Venturi tube where saturated gas stream reaches maximum velocity of 12,000 fpm.

61. Lauterbach, K.E.

A NEW DESIGN OF FILTER HOLDER FOR

DUST SAMPLING. Rochester U., N.Y.

Report No. UR-286, 15 Oct 53, 4p.

(Contract W7401-eng-49) ASTIA AD-

26 484

A new quick-acting filter holder is described for air sampling with molecular filter disks. The experimental model has proved to be satisfactory for holding molecular filters, especially those of the thin sheet variety.

62. Lemos, B.M.

Four sets of conditions demand un-

usual and flexible system. HEATING,

PIPING & AIR CONDITIONING v. 31, n. 6,
p. 100-102, June 1959.

Problem of air conditioning 320 ft x 320 ft two-story building for manufacture and testing of highly sensitive electromechanical components for aircraft; building is divided into four areas by movable partitions; areas may be increased or decreased at any time to accommodate new production procedure requiring either more or less critical temperature, relative humidity, and dust control tolerances; how air conditioning problems were solved.

63. Leng, R.B.

Controlling dust in microwave tube assembly plant. ELECTRONICS v. 28, p. 238-40, April-June 1955.

A description of a completely flexible unit that can be adapted to other production areas is given. The heart of the system is a ceiling-mounted electrostatic dust precipitator plus a deep-pack filter to catch heavier particles.

64. Lieberman, A. and Stockham, J.

Automatic techniques of airborne particle counting. AIR ENGINEERING Pt. I: v. 2, n. 12, p. 40-42, December 1960; Pt. II: v. 3, n. 1, p. 37-39, January 1961.

Here's a special report from Armour Research Foundation on airborne particle size and concentration in white room areas, as recorded by automatic counter.

65. Lodge, J.P. and Tufts, B.J.

TECHNIQUES FOR THE CHEMICAL IDENTIFICATION OF MICRON AND SUBMICRON PARTICLES. Chicago U., Technical Note no. 8, 22 Nov 55, 7p. Reprinted from TELLUS v. 8, p. 184-89, 1956.

ASTIA AD-133 838h

Chemical methods are presented for routine identification and size estimation of water-or acid-soluble particles of a number of chemical species, using spot test techniques and light or electron microscopy. Although the work reported here is primarily that of the authors and their co-workers, a brief literature survey of work in other laboratories is included.

66. Loumas, W.A. and Shepard, E.C.

Environmental control for producing

ball bearings. AIR CONDITIONING,

HEATING & VENT v. 56, n. 3, p. 69-70,

March 1959.

Ventilation, air cleaning and refrigeration systems installed at plant of Barden Corp, Danbury, Conn, manufacturers of ball bearings, to provide proper air conditions for tolerance control, rust prevention of bearings and air cleanliness.

67. Lunde, K.E. and Lapple, C.E.

Dust and mist collection. CHEM.

ENG. PROGRESS v. 53, n. 8, p. 385-91,

August 1957.

Basic performance principles of dust collection equipment are summarized; major problems in measurement techniques, and areas for potential development are discussed.

68. Lunde, K.E. and Lapple, C.E.

Critque on the state of the art

of dust and mist collection. CHEMICAL

ENGINEERING PROGRESS v. 53, p. 385-91,

August 1957.

69. Maier, K.H.

Aerosolfiltration mit Hilfe von

Membranfiltern. KOLLOID ZEIT v. 146,

n. 1-3, p. 151-56, April 1956. (In German)

Aerosol filtration with aid of membrane filters; method for collection and evaluation of dust specimens; advantages of method, with which it is possible to distinguish between opaque particle (coal dust) and mineral constituents, such as quartz; data based on joint research of German coal mining concern, Silicosis Research Institute and Membrane Filter Co.

70. Morrison, C.A.

Dustograph. SOCIETY MOTION PICTURE

& TELEVISION ENGINEERS JOURNAL v. 66,

n. 3, p. 108, March 1957.

Description of portable instrument for rapid, volumetric determination and recording of less than 1- to over 100-micron particle content in atmospheres; dust is collected by impingement on moving ribbon of acetate film; optical density is measured at site of deposition on ribbon and recorded; constancy of airflow and positioning of ribbon with respect to orifice are controlled by application of aerodynamical principles.

71. No moving parts inside hot dust

collector. CHEMICAL ENGINEERING

p. 188-190, August 1957.

(1) A description of the "MIKRO-PULSAIRE" collector operating on the air jet, venturi-nozzle arrangement has no moving parts. At the present (1957) initial cost is higher than shaking-bag collector but considerably lower than blow-ring collector. After mass production is underway, costs will be lowered considerably. (2) Even though the wet scrubber matches the ductwork for size it hits new performance peak and economy levels.

72. Now: Dust collector without moving

parts. CHEMICAL WEEK v. 81, p., 83-

84, July-Sep 1957.

This is one of several articles describing the "MIKRO-PULSAIRE" collector. At a slightly higher initial cost it reduces wear and maintence.

73. Nuclear clean workshop at Erith.

ENGINEER v. 210, p. 675-76,

21 October 1960.

74. Nunlist, A.

Report on a pump operated air

aspirator. JOURNAL OF SCIENTIFIC

INSTRUMENTS p. 221, June 1960.

The most accurate dust sampling instruments are those using the principle of thermal percipitation. The difficulties of using this instrument are described in this article.

75. Ottavio, J.J.

How clean can you get?

PLANT ENGINEERING p. 106-109, 216,

February 1960.

A superprecision ball bearing plant in order to hold parts within tolerance specifications must maintain an area clean enough to prevent rust and foreign matter from causing malfunctions.

76. Poppoff, I.G.

DUST SAMPLING BY THERMAL PRECIPITA-

TION. Naval Radiological Defense Lab.,

San Francisco, Calif. 8 Dec 52, 18p. AD 4601

The theory of thermal precipitation is summarized, and its applicability to the operation of aerosol collectors is considered. The essential characteristics of thermal precipitators are discussed. Thermal precipitation provides a good sample for electron-microscope analysis because the precipitator collects small dust particles without agglomeration or size discrimination at least below 10 μ; its action is gentle enough to allow precipitation directly and without damage on Formvar-covered electron-microscope specimen screens. The low sampling rates and possible size discrimination in the large particle range (above 10 μ) were disadvantageous. A limited investigation was made of the operating characteristics of an oscillating thermal precipitator.

77. Ranz, W.E.

Principles of inertial impaction.

PENNSYLVANIA STATE UNIV.-DEPT. ENG.

RESEARCH BULLETIN n. 66, 41p., 1958.

Survey of information applicable to analysis of mist and dust collectors; theoretical analysis of impaction efficiencies of nearly all types of inertial separation equipment interpreted in terms of few basic flow systems; graphs and sample calculations.

78. Ranz, W.R. and Katz, E.J.

A TEST METHOD FOR EVALUATING MIST AND DUST COLLECTION EQUIPMENT. Pennsylvania State U., College of Engineering and Architecture, University Park, Pa. Engineering Research Bulletin No. B-73, Aug 58, 27p. ASTIA AD-201 302

This report describes an experimental test stand developed for the evaluation of the performance of mist and dust collection equipment. It discusses a procedure for measuring impaction efficiencies and certain other performance characteristics of collectors, and it shows how data can be obtained for a scientific analaysis of such equipment. A sampling system was developed which measures the concentration of various sizes of mist before and after the collector that is being used. By separating the sample into size fractions, the device is capable of distinguishing impaction efficiencies for different ranges of particle size as well as over-all efficiencies.

79. Removal of dust. ENGINEERING v. 181, n. 4701, p. 216-17, 13 April 1956.

Scope and application of cyclones in forms manufactured by Mancuna Engineering Ltd; Mancuna-Microclone collector is assembly of number of small cyclones; Dustex collector operates on controlled helical flow principle.

80. Roeber, R.

Messtechnische Erfassung von Feinstaeuben mit konimetrischen Messgeraeten. TECHNIK v. 11, n. 8, p. 580-84, August 1956. (In German)

Measurement of fine dust particles with konimetric instruments; functions of konimeters; continuous (optinum) and discontinuous konimeters.

81. Roeber, R.

Photometrische Auswertung von Feinstaub-Praeparaten. STAUB v. 19, n. 3, p. 73-78, March 1959. (In German)

Photometric evaluation of fine dust samples, such as supplied by conimeters and thermal precipitators; introduction of notion of "photometric dust concentration" as distinct from "particle concentration", how photometric dust concentration of samples can be measured using conimeters or other devices and methods of measurement.

82. Rosinski, J. and Lieberman, A.

Automatic isokinetic sampling.

APPLIED SCI. RESEARCH SEC. A v. 6,

n. 2-3, p. 92-96, 1956.

Details of automatic device constructed for sampling air; automatic feature consists of motor operated bypass valve controlled by Wheatstone bridge; transducers, sensitive to changes in air velocity, are sensing elements in bridge; experimental results are given in which controlled sampling velocity was shown to follow changes in wind velocity very accurately.

83. Ross, C.R.

Review of dust assessment techniques.

CANADIAN MINING AND METALLURGICAL

BULLETIN v. 53, p. 419-23, 1960.

84. Sabatini, J.N.

Missile plant has both packaged units

and built-up systems. HEATING, PIPING

& AIR CONDITIONING v. 31, n. 7, p. 109-11,

July 1959.

To satisy air conditioning needs of different areas in missile manufacturing plant of Chrysler Corp, varying in tolerances of temperature, humidity, air cleaniness and cooling load, packaged units and built-up systems were installed; radial type compressors and water cooled condensors combined with fan-coil units serve areas with widely fluctuating loads; equipment selection criteria, design for reliability; package unit modification procedures.

85. Smith, J.L., Jr. and Goglia, M.J.

The mechanism of separation in the

lower-type dust separator. ASME

TRANSACTIONS v. 78, p. 389-99,

1956.

The air-flow pattern through the separator was found to be the controlling factor in its performance. The most desirable pattern prevailed when the velocity of the blowdown portion of the inlet air stream was constant from inlet to blowdown. Particle-path studies showed that an effective Louver-blade shape separates the region of particle impacts with the blade from the region where the air is passing between the blades. An approximate analysis of the particle paths was developed, which is helpful in explaining the trends in the experimental data.

86. Somers, J.C.

Dust and fume control.

MECHANICAL ENGINEERING v. 79,

p. 1022-24, July-Dec 1957.

How to eliminate industrial dusts, fumes, odors and toxic conditions from the modern industrial plant.

87. Somers, J.C.

Materials-handling engineering in

dust and fume control. AMERICAN SOCIETY

ENGINEERS PAPER n. 57-SA-86, for meeting

June 9-13 1957. 7p.

Importance of adequate dust and fume-collection and separation installations for safety, health, economic, and plant operation reasons; important considerations are proper engineering layout of complete system, observance of codes of private agencies as well as those of government, investigation of safety agencies as well as those of government, investigation of safety limits of particular dust or fume used in layout, study of dust loading in system proposed, etc.

88. Sullivan, L.J. and Willingham, C.B.
Fractionation of dust fall samples by physical methods. AIR POLLUTION CONTROL ASSN. JOURNAL v. 7, n. 1, p. 50-53, May 1957.

Two fractionation techniques applied involve separation of particles on basis of common physical properties of ferromagnetism and particle density; technique for separation of particles showing ferromagnetic properties from mixtures with nonmagnetic particles; method for separation of nonmagnetic particles on basis of their difference in density.

89. Superclean rooms for precision manufacturing. POWER v. 104, p. 70, October 1960.

90. Super-clean testing labs. air conditioning. HEATING & VENT. v. 55, n. 11, p. 89-90, November 1958.

Federal Telecommunication Laboratories of International Telephone & Telegraph Corp, San Fernando, Calif, provides three types of work areas: super clean, vapor controlled, and universal area; 22,400 sq ft fully dust controlled, air conditioned building features double walls with 1-p air spaces between walls, air to air heat pumps for comfort conditioning, six separate plumbing and four waste disposal systems.

91 SYMPOSIUM ON DUST CONTROL AND WHITE ROOMS, TEMPE, ARIZONA, NOVEMBER 1960. Editor, Air Engineering Busenen News Pub. Co., 450 W. Fort Street, Detroit 26, Michigan. $5.00

92. Talvitie, N.A. and Paulus, H.J.

Recording, photometric particle-size analyzer. REVIEW SCI. INSTRUMENTS v. 27, n. 9, p. 763-67, September 1956.

Details of analyzer useful in comparing particle size distributions of dusts in subsieve range; instrument follows progress of sedimentation of suspension by means of collimated beam; provision for continuously varying sedimentation depth allows analysis of entire range within 1 hr; design features of optical system and temperature control.

93. Taylor, G.J.

Are industrial dust problems increasing? SAFETY MAINTENANCE v. 120, p. 30-32, July 1960.

94. Vlahos, C.J.

How to get rid of dust. MILL & FACTORY v. 63, n. 6, p. 95-98, December 1958.

Use of dust collectors to reduce air pollution, prevent damage to machines and products, improve working environment, and salvage materials; choice of right collector; table presents 14 types of collectors, with technical descriptions, uses, and limitations of each; drawings show dust collector types.

95. Watson, H.H.

DUST SAMPLING AND THE PREVENTION OF DUST DISEASES. Suffield Experimental Station (Canada). Report No. TL-17-55, 1954, 6p. ASTIA AD-64 903

(Not available from ASTIA. Refer to the BRITISH JOURNAL OF PHYSICAL MEDICINE, p. 1-6, December 1954).

96. Watt, W.S.

"Clean room" in a big tent.

PLANT ENGINEERING, p. 90-93,

April 1959.

A discussion of the problems which face the producer of GSE equipment that must be surgically as well as industrially clean.

97. Water sprays help capture dust.

CHEMISTRY & ENGINEERING NEWS v.

35, p. 74, 24 June 1957.

Compact new dust collector can be inserted directly into existing duct work.

98. Wet scrubber fits into duct.

CHEMICAL ENGINEERING p. 192, 194,

August 1957.

Even though it matches the ductwork for size, this dust collector hits new performance peak and economy level.

99. Whitby, K.T. et al

ASHE air-borne dust survey.

HEATING-PIPING v. 29, p. 185-92,

November 1957.

Measurements of particle size distribution of airborne dust samples taken in the particle technology laboratory made by light microscope and centrifuge sedimentation are reported. Their validity was checked by comparison of the calculated optical densities with those measured by photometric evaluation of dust spots. This investigation indicates that sedimentation size analysis of airborne dusts collected on milliphore filters in combination with photometric evaluation of dust spots is a practical procedure for evaluating the size distribution of air-borne dusts, down to about 0.3 μ (microns). Other experiments in combination with calculations from light scattering theory show that the dust spot method for evaluating air-borne dust concentration is most sensitive to particles between 0.3 and 1.5 μ with peak sensitivity at about 0.7 μ.

100. Whitby, K.T. et al
Size distribution and concentration
of airborne dust. HEATING-PIPING
v. 27, p. 121-28, August 1955.

This paper describes the results of the first part of the ASHE dust survey, which had as its principle objective the determination of air-borne dust properties that have an effect on the performance of air cleaners. Properties determined were: concentration on fibrous and fine particles, stain concentration, particle density, porosity of packed sediment and dust fall.

101. White rooms for Project Mercury.
AIR ENGINEERING v. 2, n. 11, p.
28-32, 58, November 1960.

102. Wilcox, J.D. and Van Antwerp, W.R.
Sampling techniques for small air-
borne particles. AMA ARCHIVES
INDUSTRIAL HEALTH v. 11, p. 422-24,
May 1955.

...Particle size distribution by combined use of light and electron microscope.

103. Wilson, E.F.
Dust control in glass manufacturing.
GLASS INDUSTRIES v. 41, n. 4, p. 202-
203, April 1960.

Some problems created by dust in the glass industry are also found in photography laboratories; therefore, some solutions of these problems could be of interest in the photographic laboratory.

104. Windowless factory. HEATING v. 20,
n. 155, p. 237-30, October 1958.

See also ENGINEERING v. 186, n. 4836,

p. 645-46, 14 November 1958.

To maintain dust-free atmosphere and flexible factory floor layout. Semi-conductors, Ltd, plant at Swindon, England, was designed without windows; air conditioning plant maintains temperature at 68 minus or plus 2 F and relative humidity at between 45 and 55%; building divided into 13 zones for air conditioning with each zone fed from self-contained plant; heating and humidification requirements met by gas fired boiler rated at 1400 lb of steam per hr at 212 F or above.

105. Wohlfarth, G.

Industrielle absauganlagen. TECHNIK

12, n. 2, p. 101-106, February 1957.

(In German)

Industrial exhausts; types of air pollution in workshops; dust collector systems, their operation and effects.

106. Zilliacus, P.W.

Ways to save space in dust collector

installations. FOUNDRY v. 87, p. 222,

224-25, October 1959.

Some of the problems encountered in dust collectors are high initial costs, installation charges, continuing expenses for operation and maintenance. The author thinks that most of these problems can be solved with the new dust collecting method developed by Joy Mfg. Co. called the "JOY-MICRODYNE".

107. Zoller, R.J.

New ideas in dust control.

SAFETY MAINTENANCE v. 113, p. 56-57+,

March 1957.

108. Zoller, R.J.

Unique ideas battle dust problems.

ENG. & MIN. JOURNAL v. 158, n. 1,

p. 105, January 1957.

Localized and intermittent dust control at Synthetic Mica Corp plant in Caldwell Township, N.J., achieved through use of dust exhaust hood; demountable aluminum room about 12 ft high contains dust and carries it to 10,000 cfm Pangborn collector; cloth filter bags separate dust in Pangborn collector and machine is mechanically rapped at 5 min intervals for four hours.